



Aerosols



Presentation by: Courtney Cohen

Mentors: Elizabeth Rudolph, Jeffery Steiner,
Meranda Roberts, Marlon Ulloa UG

Team: Sarah Moshary, Asal Khanbilvardi,
Amanda Steiner, Louisa Smith

Abstract

- The purpose of our research and experiments is to identify and classify the micro-biologic components of New York City aerosols. Biologic characterization is possible through cultivation and analysis by optical fluorescence. In doing this we will be able to observe the evolution of the aerosols in the City and track their dispersal paths and locate sources.

Our Plan

- To filter New York City aerosols
 - To cultivate aerosol samples and attempt to identify micro-organism species by:
 - Examining our samples for spores using the Fluorescence Spectrometry
 - Phase contrast microscopy
 - Scanning Electron microscopy
- *To learn to evaluate data and present results

What is an aerosol?

- Tiny particles suspended in the air
- Tend to cause cooling on the Earth's surface
- Scatter light
- Originate from:
 - Smoke/Smog
 - Transportation
 - Fossil Fuels
 - & other man made sources



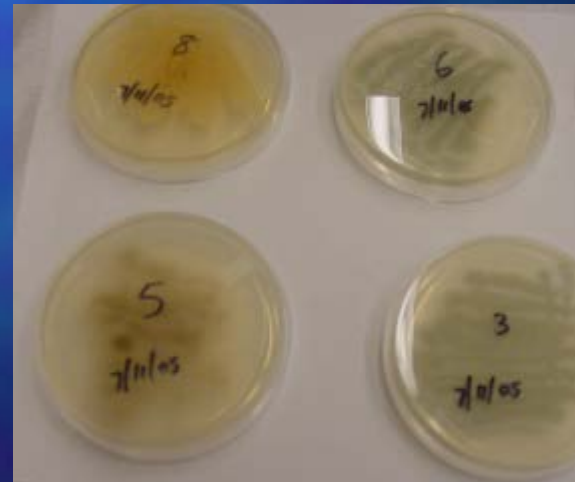
Filtering

- Filtering is a technique used to collect different components of air. We filter the air with two different pumps and filter paper. We set the pumps outside daily and allow four hours for the collection. After the four hours we use the collection to run various series of tests.



Cultivating

- Cultivating is a procedure done to find the different bacteria collected from the filter. The filter's components are swabbed on an agar plate and allowed to grow. Afterwards, we use different microscopes and x-rays to analyze the growth on the plate.



Fluorescence Spectrometer

- Using the Fluorescence Spectrometer is a way to find the spore count in the aerosol samples collected. The collection from the filter is inserted into a curvet that is placed into the Fluorescence Spectrometer. The spectrometer creates graphs that display the spore count found on the filter.



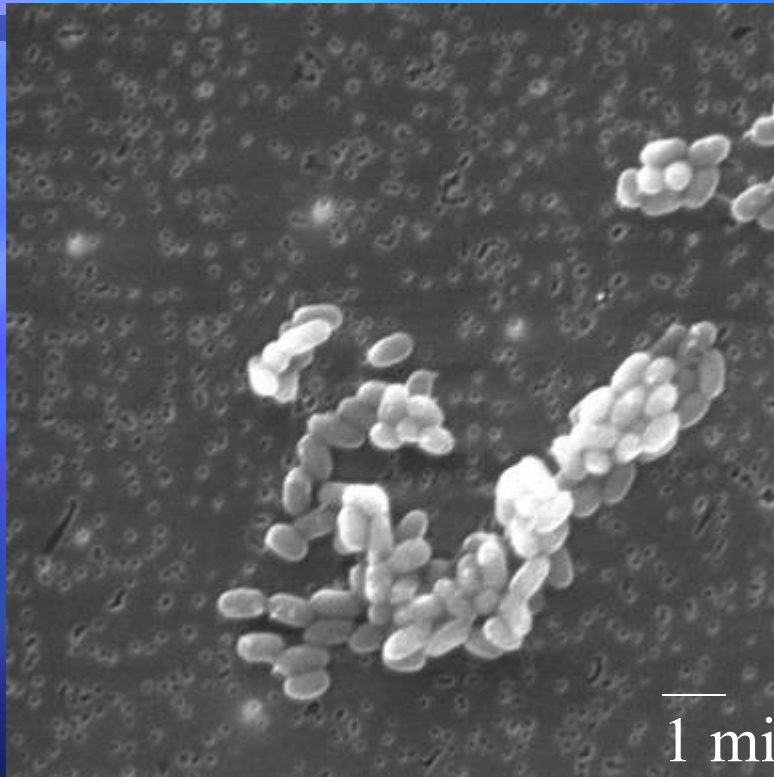
X-Ray Fluorescence

- We use the XRF to find the different components such as calcium, iron, titanium among others that are collected on the filter. In order to x-ray the components we must create compresses and insert them into the XRF which then displays the components found on the the compressed filter.

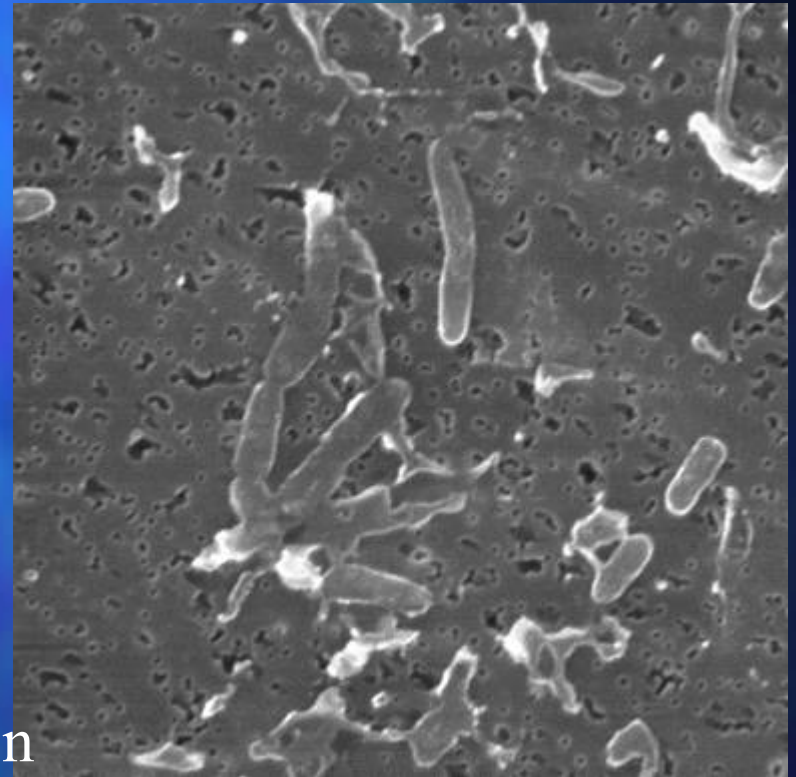


Scanning Electron Microscope

- The SEM is a microscope that helps to detect the different elements that the sample may contain. The SEM also magnifies the sample large enough to classify what it might be. For example, the sample may have the characteristics of a bacteria, spore or fungus (just to name a few); along with containing different elements like carbon, oxygen, or various other elements.



1 micron



SEM Images July 11 cultures

bacteria spores

Phase contrast images 400X

unidentified microorganism

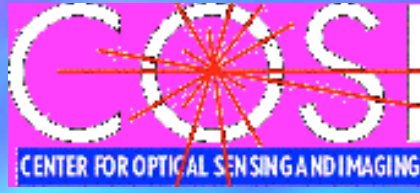
bacteria filaments

Importance

- This research is very relevant to human health and safety in the environment as we realize that aerosol transport is global. Contaminants and diseases can be transported for many miles and even across oceans.

References

- <http://earthobservatory.nasa.gov/Library/Aerosols>



Acknowledgements

- NASA SHARP
- Summer Programs
 - NASA COSI
 - DoD NPC
- City College New York
- CREST-CMMS
- NYC-MTA

- Mentors
 - Elizabeth Rudolph
 - Jeffery Steiner
- Team
 - Sarah Moshary
 - Asal Khanbilvardi
 - Meranda Roberts
 - Asya
 - Marlon Ulloa
 - Krystal Thomas

Thank You for
Your Time and Patients

Are there any questions?